

INTRODUCTORY REVIEW

A New Quadrennium

The Role of PASB

During 1955 the Pan American Sanitary Bureau (PASB) continued to fulfill its long-established role of cooperating with governments throughout the Americas in helping "to combat disease, lengthen life, and promote the physical and mental health of the people." Headquarters are in Washington, D.C., but zone and field offices reaching out deeply southward have for some years now been established in Mexico City, Guatemala, Kingston, Lima, Rio de Janeiro and Buenos Aires. Government health programs, with the PASB cooperating directly through the zone offices, have increased in scope and influence. This is in accordance with a plan of PASB decentralization, now in full operation for some four years.

The Pan American Sanitary Bureau is an international public health organization created and maintained by the Republics of America. It is the oldest international health body in the world. It was organized by the First Pan American Sanitary Conference in 1902.

The functions of the Bureau are defined by the Pan American Sanitary Code (1924), a treaty ratified by all 21 Republics. Article LV of this Code makes the Pan American Sanitary Bureau a central coordinating agency with an almost bewildering variety of duties, all relating to health.

As the 1924 Code provides, the Bureau is to appoint representatives to confer with the health authorities of the various signatory Governments; to receive, publish and distribute information on vital statistics, public health organization, preventive medicine, and other pertinent information; to undertake cooperative epidemiological studies; to stimulate and facilitate scientific research; to bring about exchanges of professors, medical and health officers, experts, and advisers in public health; and to provide technical information relative to the actual status of communicable diseases, progress effected in the control or eradication of such diseases, and new methods for combating diseases. All of these things almost without exception, the Bureau has been doing to this day.

In 1947, the Twelfth Pan American Sanitary Conference, at Caracas, established the bases for the Constitution of the Pan American Sanitary Organization (PASO) and the conditions for negotiating an agreement with the World Health Organization (WHO). The rapid expansion of the Bureau

to its present size has taken place chiefly in the last eight years.

By the Agreement (May 24, 1949) between the two organizations, PASB functions also as the Regional Office for the Americas of WHO. In this Report, for the sake of simplicity, the term Bureau or PASB will be used to mean the Pan American Sanitary Bureau, Regional Office of the World Health Organization.

In carrying out its tasks, PASB works in close harmony with a number of other organizations, including the United Nations International Children's Fund (UNICEF), the International Cooperation Administration (ICA), the Food and Agriculture Organization (FAO), and the Organization of American States (OAS).

By the Agreement (May 23, 1950) between the Council of the Organization of American States and the Directing Council of the Pan American Sanitary Organization, the latter is recognized as an Inter-American Specialized Organization in the field of public health.

Cooperation with closely associated international organizations will often, but may not in every case, be specifically acknowledged in this Report.

In the next section brief mention is made of highlights as to budget and program. A more detailed picture of sources of funds and interrelationships of activities with other organizations is given in a later section of this Report. (See page 128)

Budget and Program

The regular funds of the Bureau consist of annual PASO quota contributions from the twenty-one American Republics and from France, the Netherlands and the United Kingdom, plus a share of funds raised by WHO by similar contributions from WHO Member Governments. The Bureau gives technical supervision to many programs receiving United Nations Technical Assistance (UN/TA) funds and participates in the OAS Technical Cooperation Program receiving OAS/TA funds. Expenditures of the PASB in 1955 amounted to \$4,547,277.65 of which roughly three million dollars came from regular PASB/WHO funds and the remainder from Technical Assistance or Extra Budgetary funds. In 1955 an additional amount of \$3,156,294.45 in equipment and supplies was made available to Governments by UNICEF for projects in which PASB/WHO participated.

One objective of the Bureau is to develop national programs carried out under government auspices. The Bureau always operates on invitation by governments and in collaboration with governments. It does not have working forces of its own which can go into the field and carry out campaigns against diseases. It does have a corps of experts and consultants, who help to strengthen the health departments of governments through cooperation, aid in planning, and provision of technical assistance. The Bureau also acts in general as a clearing house for scientific enlightenment aiming to see to it that in matters of medical and public health knowledge all nations of the Americas will share and share alike.

It also helps by providing opportunities for training. This training on all levels, includes in its scope medical men, engineers, nurses, nursing auxiliaries, sanitary inspectors, and other health workers of various categories. The aim is to make such training, given either within or outside of the country, part of a thoroughly planned and consistently executed program. Each year several hundred selected workers, many of whom will occupy strategic posts in health work or health education, are thus given the opportunity to acquire the training which can make their work effective.

Other aspects of this educational program are taken care of by the conferences and seminars and by the variety of publications sponsored by the Bureau.

Since the Bureau was firmly established on a broad Pan American basis its specific health programs have grown in scope and in direction. By growth in direction is meant that at approximately quadrennial intervals the goals of these programs are re-examined and made more specific by the Pan American Sanitary Conference, the supreme governing body of the Bureau.

The latest appraisal of this sort took place just before the beginning of 1955 at the Fourteenth Pan American Sanitary Conference held in Santiago, Chile, October 7-22, 1954. During the busy weeks of this gathering there was hammered out a program the nature of which comes out unmistakably in the major resolutions taken.

These resolutions which go into considerable detail cover five main points: 1) better health statistics, 2) a determined attack on infant diarrheas, 3) improved environmental sanitation, 4) continuation of the strong initial successes against treponematoses, 5) and as a crowning effort the carrying forward to completion of malaria eradication from the Americas.

Malaria Eradication

Much will be said about malaria eradication both in this Introduction and also later on in the body of the Report, because a substantial part of the PASB effort in 1955 went into the planning, launching, and forward projection of a hemispheric malaria eradication program. During this year a special office, known as the Coordination Office of the Malaria Eradication Program (COMEP), with its initial location in Mexico City, was set up as an integral part of the PASB. During this year also Mexico announced a \$20,000,000 malaria eradication campaign to extend over four years. Because of the size and importance of the malaria eradication effort in Mexico that country was chosen as headquarters for COMEP which, however, also serves the whole of the Americas. With the campaign in Mexico firmly launched, the past year has witnessed the spearheading of a movement that should eradicate malaria from the Americas.

It was heartening when the largest nation in America achieved success in its malaria eradication program just a few years ago. The U.S. Public Health Service followed up its World War II anti-malaria activities with the National Malaria Eradication Program. This was inaugurated in 1945, with the cooperation of certain state and local health agencies. Eradication operations reached their peak in 1948 when

1,365,000 homes in 13 States were sprayed at a cost of \$5,000,000, following which it became possible to curtail operations each year until 1952, when less than 100,000 houses were sprayed. For several years the cases of indigenous malaria occurring in the U.S.A. have been secondary to imported malaria from Mexico or from the Pacific. Only 46 such cases were found in the U.S.A. during 1954 and none, established as indigenous, was reported in 1955.

Theoretically malaria can be eradicated from a given area in three years by a method which is now beginning to be well understood. In the absence of reinfection the malaria organism usually disappears from the human host within three years, but on national eradication programs allowance must be made for delays in development of training of staff as well as possible administrative inexperience. Malaria is transmitted by various species of *Anopheles* mosquitoes, but the species most dangerous as vectors of malaria are those which enter human habitations in search of human beings to feed upon. Since *Anopheles* usually rests on walls before or after sucking blood, putting a powerful insecticide, DDT, on these walls is effective in eliminating the infective mosquito. More details on how and why this happens will be given later on. Thus transmission of malaria is stopped by a chemi-

cal attack on mosquitoes which enter the home. This ingenious solution, which limits antimosquito measures to the home, is a great improvement over antilarval measures, which had to be applied to extensive ground-breeding areas.

The new method of malaria eradication has brought about some surprising changes in method. Nowadays malaria work should be measured not by what has been done but by what remains to be done. It used to be that if a disease was 80 per cent conquered everyone felt happy, but now in malaria at least all eyes are centered on the last remaining cases. The work left to be done used to be measured by the prevalence of mosquito larvae. Now it is measured by the number of houses in which infected persons live.

The Seriousness of Malaria

The tremendous cost and the tough perseverance needed to rout out the remnants of malaria from this hemisphere is put into the right perspective, if it is remembered that malaria in its malignant form is a highly fatal disease. Historically its main ravages have been among the young. It is still one of the world's great killers of children.

Malaria as it was unchecked before the days of quinine and modern medication, has wiped out civilizations, and given back straight to the jungle large areas of inhabited land. Malaria can be a scourge of nations and a crippler of individuals. Populations, where malaria is chronic, drag along on a bare subsistence level. Even when it is present with a relatively low infection, malaria inhibits to a surprising degree both mental and physical effort.

The Magic of DDT

No wonder that centuries ago, first cinchona bark and then its alkaloid derivative, quinine, was hailed as a sovereign remedy. Quinine does not cure malaria infection but it does cure the attack of chills and fever leaving, however, a seed bed to produce a later attack. Late in the last century the connection between the mosquito and malaria slowly came to light. Then in the first half of the present century an enormously varied general attack against mosquitoes has helped to keep down malaria, but neither drainage nor screening nor dusting with Paris green nor the use of fish to eat mosquito larvae are anywhere near efficacious enough to finish the job largely because if thoroughly done they are too expensive. It wasn't until the introduction of DDT as a residual insecticide that economically feasible measures for the control of rural malaria became possible. All this has happened practically within the last decade.

The Economic Damage of Malaria

In addition to being a potential killer malaria robs a nation of its economic strength. Malaria degrades and enslaves. No infected area can compete in agriculture or industry with a non-malarious region. Malaria cuts labor efficiency down by half or more.

Less than 30 years ago the estimated annual cost of malaria to southeastern United States was over \$500,000,000. Today industry is expanding in all of those states from which malaria was banished. After World War II malaria control in Greece in a single year augmented the labor effort by thirty million man days. In Burma and in Pakistan rice production increased 15 per cent within the first year after malaria was controlled. In Iran with malaria kept down, four laborers in rice harvesting could do the work of ten. It is because it makes possible these great savings that malaria eradication has come to be considered a good investment.

This is not to say that malaria eradication is cheap. It is expensive. It involves a large capital expenditure. But it still pays off handsomely, especially in the long run.

Impact of DDT

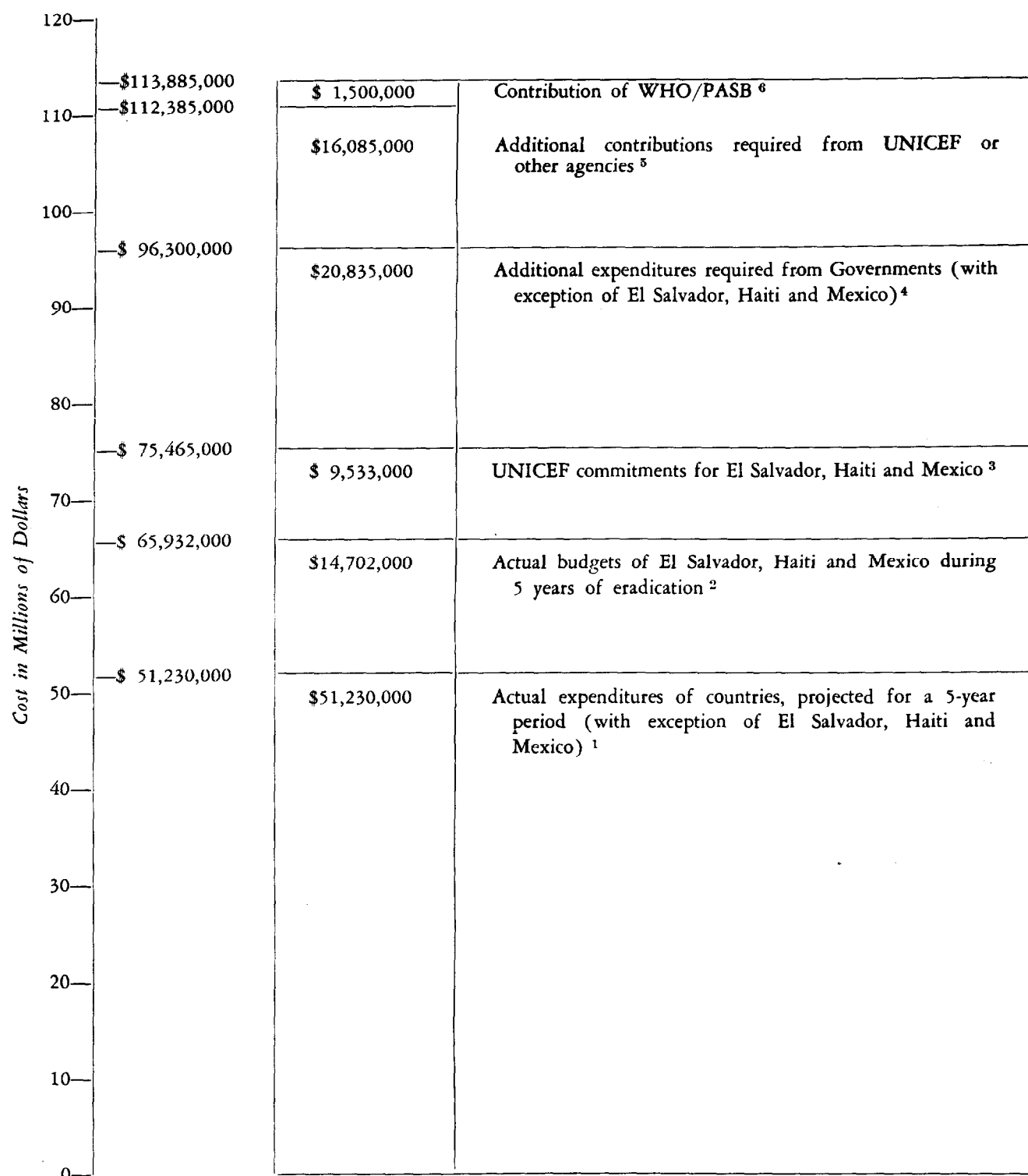
During a full half century after discovering that malaria is a mosquito-borne disease, and until only a short decade ago, malaria was the most difficult problem facing public health workers in the tropics and sub-tropics, and in many parts of the temperate zones. Previous to the introduction of DDT as a residual insecticide, economically feasible measures for the control of rural malaria were not known. The initial results of this new measure have been dramatic.

The introduction of DDT has halted expensive drainage works as well as costly larviciding operations, and has led to the control of malaria in many agricultural areas, where the isolation of dwellings one from another makes other methods of control impractical. Thus the road was cleared to the development of nation-wide control programs. These in turn led to the most promising observation that malaria, as a mosquito-borne disease, disappears from an infected population within a few years after transmission ceases. The further observation has been made that malaria reappears in cleared areas only when reintroduced by an infectious person from an endemic zone. The United States, for example, parts of which were previously highly malarious, has been free of epidemics of malaria for a decade except for a small outbreak of 35 cases infected in 1952 by mosquitoes which had fed on a returned veteran from Korea.

By 1950 nearly all countries in this hemisphere with a malaria problem were engaged in serious efforts to control it. Malaria was eradicated from Chile, French Guiana, Puerto Rico and the United States, and nearly gone from Argentina, British Guiana and Venezuela. Control programs were well advanced in most of the other American countries. So rapidly had programs expanded that approximately 75 per cent of the total homes in the malarious zones of the Americas were sprayed that year. It was hoped that the remaining 25 per cent (four and one-half million homes) would soon be brought into the program.

To stimulate further progress and boldly aiming at eradicating the disease from the Western Hemisphere, the

**MALARIA ERADICATION—WESTERN HEMISPHERE
SUMMARY OF COSTS**



EXPLANATION OF COSTS

¹ Based upon actual expenditures of all Governments (except El Salvador, Haiti and Mexico), projected over a 5-year period.

² Actual commitments of El Salvador, Haiti and Mexico for 5-year programs of eradication.

³ UNICEF commitments to El Salvador, Haiti and Mexico for 5-year programs of eradication.

⁴ Based upon labor and administrative costs for additional houses which must be sprayed by all Governments (except El Salvador, Haiti and Mexico), for 5 years to achieve eradication.

⁵ Based upon supply requirements of US\$ 0.50 per spraying, for additional houses which must be sprayed for 5 years, to achieve eradication.

⁶ Based upon personnel required by COMEP, plus 20 consultants to countries.

Thirteenth Pan American Sanitary Conference (1950) recommended that the PASB coordinate anti-malaria programs of individual countries.

Campaigns were expanded by Governments, as trained technicians became available in countries, and equipment and materials were supplied by UNICEF to the Caribbean and Central American area and four South American countries. Malaria control campaigns were initiated in every malarious country of the hemisphere. The disease toppled from its position as the leading public health problem in the Americas. Hopes were high and the enthusiasm of the average householder for the method appeared to ensure success of the eradication program.

DDT Resistant Anopheles

But success was not to come so easily. Unfortunately, the house fly, which was the householder's visible measure of the value of any insecticide, developed a marked resistance to DDT, and the residual spray program lost much of its initial prestige. The publicity given to the rapid reduction in malaria following the introduction of residual spraying, resulted in the general conviction that malaria is no longer an important problem and can safely be disregarded.

Instead of rapidly increasing appropriations, a lag set in and four years later, 1954, 22 per cent of the homes in malarious areas still were not included in control programs. Authorities reacted to other fiscal pressures and reluctantly appropriated funds for controlling a disease which seemed to cause but little

damage. This situation, disappointing as it was, might have been gradually improved from year to year in individual countries as opportunity appeared, had it not been for the threat inherent in the recent development of resistance to DDT by certain *Anopheles*.

In Greece, the three local vectors have developed resistance and DDT is no longer effective in controlling malaria in some villages. Another important malaria vector has become resistant in Indonesia. In Central America one of the principal mosquito vectors is exhibiting a changed behavior to the insecticide, a change which may presage the development of resistance.

Urgency of Eradication

It is most unfortunate that resistance is developing before malaria has been eradicated, since the pre-DDT control methods are too expensive for general use in rural areas. It is obvious that malaria must be eradicated from the Americas before the threat of anopheline resistance to the insecticide materializes here.

The Fourteenth Pan American Sanitary Conference (October 1954) recognized the danger of prolonged control programs. The Conference bespoke the utmost urgency in achieving the continental eradication of malaria and urged the Member Governments immediately to convert all control programs into eradication campaigns.

Extra effort applied now makes the difference between success and failure. A few years of all-out drive can so reduce the amount of malaria that residual pockets may thereafter be eradicated with newly available drugs, if necessary. When malaria has disappeared, surveillance or vigilance squads can ensure continued freedom from the disease at a low and entirely feasible cost.

The full promise of eradication for the continent depends obviously on the simultaneous wiping out of malaria infection from all countries in the Americas. Once this is done, expenditures can be greatly reduced and vigilance relaxed except against reinfection through immigrants or travellers from other parts of the world.

If one laggard state, in order to reduce expenditure, fails to destroy all of its malaria, that state becomes a menace to its neighbor. Its hidden sparks may start new fires. Complete control for at least three years is necessary, because then in the absence of reinfection, malaria parasites will die out.

Conversion from Control to Eradication

Eradication depends on action at the national level. Each nation, as a member of PASB/WHO automatically has undertaken an obligation to all the other countries, as well as to its own population, for execution of an eradication program. Action in all countries should proceed simultaneously.

Inasmuch as conditions and the extent of existing control measures vary from country to country, a new plan is being



MALARIOUS AREAS IN THE WESTERN HEMISPHERE PREVIOUS TO WORLD WAR II

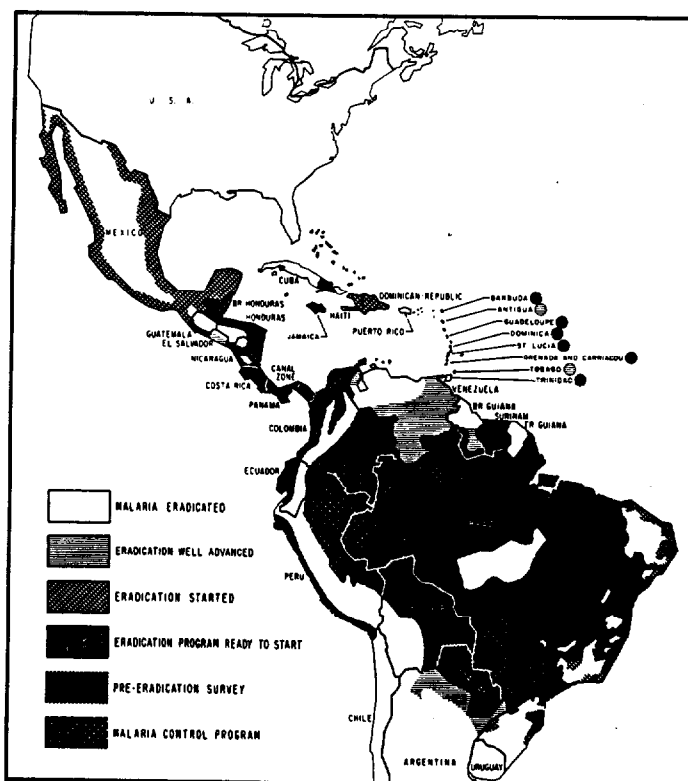
MALARIA ERADICATION VERSUS CONTROL

Item	Control	Eradication
1. Objectives	Reduce the disease	Eliminate the disease
2. Area of operation	Start where the disease is worst and does most damage	Every place where transmission occurs is important
3. Work of standards	Good work acceptable	Perfection required
4. Duration of work	No end in sight. Campaign may go on forever	Definite terminus, 3 years after transmission stops
5. Residual malaria	Of little interest	Of prime importance
6. Economic aspect	Spray within budget	Pay extra, but spray
7. Other insects	May be considered as part of the anti-malaria program	Not to be considered except for <i>Aedes aegypti</i>
8. Notification of malaria cases	Of secondary value	Of prime importance
9. Participation of other health services	Not really necessary	Fundamental to help recognize cases of malaria
10. Other professional assistance	No special interest	Needed for prompt notification of cases
11. Suspicious cases	Not important	Of prime importance
12. Imported cases	Academic interest	Crucial after spraying has been suspended
13. Epidemiological survey	Expensive and useless	Indispensable. The key to eradication
14. Administrative evaluation of progress	Measurement of what has been done	Measurement of what remains to be done
15. Epidemiological evaluation	Reduction of spleen and parasitological indices	Disappearance of endemic cases

made in each case covering the details of an eradication program. This plan provides for a unified country-wide service, operated according to international technical standards with uniform reporting procedures to facilitate international coordination and analysis.

Careful training of eradication staffs imbuing them with the philosophy of eradication, and then tight administration of the eradication work through three or more years are necessary to insure that malaria will die out of the entire human population of the area covered. Taking into consideration the recruitment and training period and the progressive nature of the organization of control measures, it is probable that the manpower, transportation, and supply requirements will be spread over a period somewhat longer than three years.

Large scale and continuous blood tests for the presence of malaria are an essential part of an eradication program. This is needed to check on the efficacy of the method and the efficiency of its application, and to signal the time when eradication has been achieved so that the costly insecticiding operations can be stopped. Surveillance must be continued long after the antimosquito measures are discontinued in an area, and if any focus of infection is found, appropriate measures must be instituted immediately.



















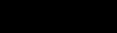









PROGRESS TOWARD MALARIA ERADICATION IN THE WESTERN HEMISPHERE
DECEMBER 1955

STATUS OF THE ANTIMALARIA CAMPAIGN, 31 DECEMBER 1955

COUNTRIES	NO MALARIA PRESENT	CONTROL PROGRAM	ERADICATION PROGRAM				
			PRE-ERADICATION SURVEY	PREPARED TO START	COMMENCED	ADVANCED	COMPLETED
ARGENTINA							
BOLIVIA							
BRAZIL							
CANADA							
COLOMBIA							
COSTA RICA							
CUBA							
CHILE							
DOMINICAN REP.							
ECUADOR							
EL SALVADOR							
GUATEMALA							
HAITI							
HONDURAS							
MEXICO							
NICARAGUA							
PANAMA							
PARAGUAY							
PERU							
UNITED STATES							
URUGUAY							
VENEZUELA							

STATUS OF THE ANTIMALARIA CAMPAIGN, 31 DECEMBER 1955

OTHER AREAS	NO MALARIA PRESENT	CONTROL PROGRAM	ERADICATION PROGRAM				
			PRE-ERADICATION SURVEY	PREPARED TO START	COMMENCED	ADVANCED	COMPLETED
DESIRADE, LES SAINTES, MARIE GALANTE, PETITE-TERRE, ST. BARTHELEMY, ST. MARTIN FRENCH GUIANA							
GUADELOUPE							
MARTINIQUE							
ST. PIERRE AND MIQUELON							
NETH. ANTILLES (ARUBA, BONAIRE, CURACAO, SABA, ST. EUSTATIUS, ST. MARTIN SURINAM							
BAHAMAS							
BERMUDA							
BRITISH GUIANA							
BRITISH HONDURAS							
CAYMANS, CAICOS, TURKS							
COLONY OF WINDWARD ISLANDS DOMINICA							
GRENADA - CARRIACOU							
ST. LUCIA							
ST. VINCENT							
TOBAGO							
TRINIDAD							
JAMAICA							
PRESIDENCY OF LEEWARD IS. ANTIGUA - BARBUDA BRITISH VIRGIN ISLANDS MONTERRAT, ST. KITTS- NEVIS - ANGUILLA							
ALASKA							
PANAMA CANAL ZONE							
PUERTO RICO							
U.S. VIRGIN ISLANDS							

Scope of DDT Campaigns

Yellow Fever Mosquito Included

Both yellow fever and malaria are carried by mosquitoes. It seems natural that campaigns against them can be combined. In the very early days, shortly after 1900, this was done by General Gorgas in Havana. However, *Aedes aegypti* breeds in the artificial water containers found around human habitations. It is a domestic mosquito, although found also in the houses of some rural areas, whereas the *Anopheles* or malaria mosquito is distinctively wild. House spraying for malaria, will eradicate *Aedes aegypti* but a program aimed solely at *Aedes aegypti* does not contribute to malaria eradication.

To destroy the *Aedes aegypti* mosquito one has to spray DDT only in and around the breeding places of the mosquito, but to control *Anopheles* mosquitoes it is usually essential to spray the entire inside walls of all the houses.

It may be asked, how does this affect the rural *Anopheles* mosquitoes which breed out in the fields or swamps. The answer, as partially explained above, is that the *Anopheles* is a night biter. Along about dusk it flies in from the fields in search of human beings to bite. Along about this time too men are returning to their homes. Although the *Anopheles* is not a house breeding mosquito, it goes on long flights in search of its human victims who do live in houses. When

the mosquito reaches a house it takes a rest first on the walls. In biting its victim the mosquito makes a thorough job of it either at one long feeding or a number of short ones. In either case the proboscis goes way in and the process of pumping up blood takes some time because it is at the same time a filtering process. The mosquito passes through its body immediately the serum or colorless part of the blood. It is after the red blood cells. If normal blood has a certain concentration of red blood corpuscles per unit, the blood inside the mosquito has three times as much. In other words, the mosquito is filtering out the colorless blood serum. It also takes on such a heavy load of blood that its abdomen visibly

extends. When it flies away with its load the course is a zig-zag one, and again as soon as possible the insect seeks a wall on which to rest and continue the filtering process or the discharge of the serum.

The wall which has been sprayed with DDT is therefore to all intents and purposes a trap, and a good trap because there are three chances to get the mosquito: 1) when it first comes into the house tired from its long flight, 2) after it has bitten the human being, taken on a load of blood, and again seeks the wall, 3) some days later when it may return for another blood meal and once more rest on the wall before or after biting.

A mosquito is not dangerous immediately after biting. There is an incubation period of about two weeks before the *Anopheles* can infect a new victim. However before this happens there are as we have seen, at least three chances that the insect will have lighted on a wall and been destroyed. It is necessary to understand this mechanism of malaria transmission in order to see why malaria campaigns based merely on house spraying can be effective.

One additional fact should be kept in mind. The most malignant malaria organism, *Plasmodium falciparum*, does not generally live over one year in the human body unless replenished; the other more common malaria producing organism, *P. vivax*, seldom lives longer than two and one-half years, and the third *P. malariae* may live longer, but it produces a few cases that can be ignored until the others are eliminated, and then be eradicated as each case is found during surveillance, and effectively treated by chemotherapy. Generally within three years the malaria organism should die out in human beings if mosquitoes are not there to keep up the supply of parasites. Keep the *Anopheles* under tight control for three years and the human population can no longer infect them.

This will be the case unless after stopping control measures, malaria is reintroduced by people from the outside. Hence malaria eradication must keep on taking in new territory. As soon as one area is cleared the work should be extended to the border areas. Nothing is more logical than that after a few countries in the Americas had banished malaria the work should be extended to all the countries in the Hemisphere. Then after the Americas, the World. There is in the nature of an eradication program a drive toward universality.

How Yellow Fever Travels

The reason for getting rid of *Aedes aegypti* everywhere, even in countries which never had yellow fever, is that that mosquito makes the country receptive to a very serious pestilential disease. Jungle yellow fever is transmitted to man in the forest by one or another of several different species of wild mosquitoes. Urban yellow fever is the very same disease transmitted from man to man by *Aedes aegypti*, a domestic mosquito of towns and cities, and certain rural areas. When yellow fever virus gets into a tropical city with lots of *aegypti* and lots of susceptible people, a great many people get infected and a severe epidemic may occur.

Jungle yellow fever is not transmitted from man to man. The infected mosquitoes which bite man in the forest and infect him get their virus from monkeys or from some other forest vertebrates—not man. This is important because forest animals—including man when he is in the forest—travel rather slowly through the forest.

Nowadays it is possible for an infected man to get on an airplane and fly almost anywhere in the world within the incubation period of yellow fever. Formerly, he got on a train, or, for longer distances, on a boat. Whatever the

means of travel, man obviously is the vehicle which yellow fever virus uses for rapid dissemination over long distances.

The last fatal case of yellow fever in the United States occurred in October 1924 when a Mexican immigrant died in Houston, Texas. He had arrived in the United States a few days before by ship from Progreso, the principal port of the Yucatan Peninsula in Mexico, just across the Gulf of Mexico from New Orleans, where he had disembarked. He went to Houston by train. The same travel route is used today, but the time needed is measured in hours instead of days.

In 1924 *Aedes aegypti* was present in Progreso, in Mérida, in New Orleans, and in Houston. The mosquito is still present in all those places today. This makes all these places receptive to yellow fever. The entire coast of the Gulf of Mexico is infested with *Aedes aegypti*, both in Mexico and in the United States. In fact, thirteen states of the United States of America are infested with *aegypti*. The eradication of *aegypti* from all this large area would be a large and expensive task, but it would be very much worth while, for it would be a definitive solution.

Somebody asks, "Why not vaccinate everybody in the threatened area against yellow fever? Would that not remove all danger?" The population of the 13 southeastern states which are infested with *Aedes aegypti* is about 39,000,000. Many millions more live in the infested portions of Mexico. To vaccinate all these people would be a large task, difficult if not impossible to perform perfectly, and one which would have to be repeated every six years, according to present practices.

On the other hand, if *Aedes aegypti* were eradicated from the infested region, the threat of yellow fever would be removed once and for all, because the mosquito needed to transmit it would not be present. Once the United States has eradicated its *aegypti* there is little danger that the mosquito would be reintroduced from the few remaining places where it is present in the Americas.

Endemic Yellow Fever Areas

A clear distinction must be drawn between the eradication of *Aedes aegypti* and the eradication of yellow fever. The former is possible and desirable; the latter is impossible. The mosquito can be eradicated from large areas, if not perhaps from everywhere; the jungle form of the disease cannot, with means now at our disposal, be eradicated from its jungle refuges in the tropical rain forests of the Congo Basin in Africa and the Amazon Valley in South America. At best the disease can be prevented if everybody who goes into those areas, and also into the forests near these areas, is vaccinated, but the virus which causes the disease in man has an extra-human reservoir, and thus can survive quite independently of man.

Jungle yellow fever is, therefore, a zoonosis—meaning a disease of animals transmissible to man. This zoonosis may

be either enzootic or epizootic. The variety of ways in which yellow fever virus manifests itself, in Africa and in the Americas—but not in Asia—is very great. The very fact that yellow fever has never occurred in tropical Asia, where conditions seem ideal for it is one of the enduring riddles of modern medicine.

This is not the place to discuss this riddle, but it is the place to stress the fact that India, Malaya, Indonesia, the

Philippines, and many neighboring countries are all receptive to yellow fever, according to the definition used in this Report.

Epidemic Irruptions

It is perhaps salubrious to recall that the jungle type of yellow fever was first recognized only 24 years ago, in 1932. It is well to be on guard in drawing conclusions because there is still a lot to learn about the matter.

A case in point is the epidemic of jungle yellow fever which began in Panama in November 1948 and spread slowly and jerkily westward and northward through Middle America until it reached northern Honduras in September 1954. There had been no yellow fever for nearly 30 years in this area. The fantastic way in which howler and spider monkeys died of yellow fever during the recent epizootic was noted in the Annual Report for 1954.

Greatly to everybody's surprise the entire year of 1955 went by without a single case of human yellow fever having been diagnosed anywhere in Middle America, or even a single positive monkey having been found. It looked as if

the epidemic had died out at about the northern limit of the range of the forest mosquito, *Haemagogus spegazzinii falco*. This well-known mosquito was associated with yellow fever in monkeys everywhere to the south and east in Central America.

The need for patience was exemplified by the finding, early in 1956, that the virus had done two surprising things. It had not died out in Honduras but in fact had spread on into Guatemala, reaching a point only 110 miles from the nearest point on the Mexican border. Ahead of it were generous tropical rain forests inviting it to come on into the Mexican States of Chiapas, Tabasco, and Vera Cruz. The

second thing was even more startling, because it was unique: the virus had remained present for 21 months in one small area of coastal forest in northern Honduras, where there were no *spgazzinii*.

In the main section of this Report there are presented data in the way of maps and accounts of present anti-*Aedes aegypti* campaigns in which the PASB is cooperating.

During 1955, Mexico unfortunately interrupted the *aegypti* eradication program which had begun to take shape in Yucatan, but with the observation of yellow fever in monkeys in Guatemala, this campaign is to be renewed.

The USPHS is investigating the *Aedes aegypti* situation in ports and coastal areas. There is as noted above every reason why the United States should join hands with the rest of the Continent in disposing once and for all of the potential threat of urban yellow fever.

Both the conquest of malaria and the control of yellow fever call for eradication techniques. And this is not the whole story of eradication. The eradication concept has an even wider bearing. It now appears that a number of diseases, widely dissimilar in modes of transmission can best be combated by ever-expanding eradication campaigns.

Conquest of Treponematoses

The Extension of Eradication Techniques

In setting up the campaigns for malaria eradication in various countries of this Hemisphere, a great deal of study was given to strategy and methods of training. On an adjoining page is given a table displaying the contrast in attitude between the methods of a campaign aiming at control and a campaign aiming at eradication. From start to finish the attitude is different.

It is this general approach, the philosophy so to speak, of combating disease, that is in this day and age undergoing a major change. Instead of merely keeping down or holding back disease, public health authorities are beginning to accept the idea that disease should be exterminated. It is cheaper and better to do away with specific infections altogether than to keep them around even at the reduced and almost harmless level from which at any time they might again flare up.

This attitude is well illustrated by the new style campaigns against yaws, one of which is nearing completion in Haiti.

Successful Yaws Campaign

As *Treponema pallida*, a spirochete, is the cause of syphilis so *Treponema pertenue*, morphologically indistinguishable from *T. pallida*, causes yaws. Yaws or frambesia, not a venereal disease, but an infectious and disfiguring affliction prevalent in the Caribbean area and elsewhere was in 1949 a major public health problem in Haiti.

From reliable sources it was concluded that the prevalence of yaws in Haiti at that time was 40 to 60 per cent. Some authorities claimed that 80 per cent of the rural population was afflicted.

Of the three more common ways of organizing campaigns

against yaws, viz., 1) permanent dispensaries, 2) ambulatory or mobile clinics, and 3) house-to-house work, only the latter can be considered where early eradication is the objective. Experience in Haiti had shown that permanent dispensaries could attract only a small part of the population. The same was found to apply to the mobile clinics. In Haiti the only way to get full coverage was to pay a visit to every single dwelling.

The anti-yaws campaign which began in 1950, is based upon the use of penicillin. A single dose of penicillin renders a case of yaws non-infectious. Fortunately, too, laymen can be trained fairly easily for this work. Such training of personnel plus the experience gained from former *Aedes aegypti* campaigns has made the yaws campaign not only a possibility but a striking success. Close attention, however, had to be given supervision and logistics.

With penicillin as the therapeutic agent of choice there was started in 1950 a campaign with the single objective of eradicating yaws.

The Government furnished personnel, fuel and lubricants to the extent of \$196,000 a year. UNICEF supplied the penicillin, vehicles, and other necessary supplies. The Bureau made available technical personnel to cooperate with the Haitian Health Administration. Field operations began July 20, 1950.

The ambulatory clinic method was used July 20, 1950, to October 26, 1951, to treat 600,000 persons mostly in southern Haiti. During the middle part of 1951 it became clear that the method had to be changed. The house-to-house method was made routine after October 27, 1951. Coverage then became practically 100 per cent. It is of paramount

importance in a yaws campaign to treat all household contacts as well as actual cases.

By December 1954 practically the whole population of Haiti, 3,500,000 persons had been treated with penicillin. After this came the mopping-up phase. Yaws eradication has probably been accomplished if no autochthonous case has occurred during a one-year period. This has not yet been ascertained but spot surveys following mass treatment showed an over-all prevalence down to 0.57 per cent. The index of infectious cases, called incidence ratio, was only 0.15 per cent.

The work in Haiti demonstrated that the key to eradication is close supervision. Eradication is never easy or simple. In the words of the consultant in active charge: "It takes means, money, time, authority and, in the tropics, sweat."

In Haiti, and in yaws campaigns in general, the use of penicillin in amount of dosage and method of administration is aimed directly at yaws. Indirectly a campaign of this kind, while not at the same time eradicating syphilis, does help to keep down and to reduce syphilis, and may therefore be considered as a step toward the conquest of Treponematoses, including syphilis.

Creating the New Outlook

The Goal of Zero Incidence

Disease control campaigns are by now a well established procedure. Against certain communicable diseases, systematized control campaigns have been in operation ever since, in the closing decades of the last century, the causative relation between germs and disease was discovered, and bacteriology came into its own. The new outlook regarding control campaigns is not to let them drag on, but to change them to eradication campaigns and so bring them to an end.

In certain diseases there has been a crescendo of improvements in control until finally the disease has been driven into a corner and the end has come in sight. This is the case with malaria which in the Western Hemisphere, as we have seen, is now ready for the kill.

Some diseases seem to disappear spontaneously before the march of civilization. This promotes a feeling of security. There is no longer the great apprehension concerning plague or smallpox, that used to terrorize the world a hundred or more years ago. However some real fears still remain. The 1918 influenza pandemic was a genuine disaster. The paralytic form of poliomyelitis is increasingly important, and hope surged around the world when the Salk vaccine appeared.

Increasingly such communicable disease threats as these are bringing about not fears but plans for eradication. The

eradication philosophy has made such a place for itself in public health thinking that in certain diseases it now seems reasonable to settle for nothing less than eradication. In other diseases some of the techniques of eradication may be applicable well before the end is near.

Eradication then is not merely a method applicable to a single disease such as malaria or even to a group of diseases; it represents a point of view. The general effect of the application of eradication principles is that it brings into view a hopeful era in which more and more diseases are forced across the goal line of zero incidence. To think of eradication in this broad way means looking very far ahead.

In tuberculosis for the first time in history a high proportion of patients can now be made non-infectious by drug treatment. New innocuous antituberculosis drugs such as isoniazid open the way for chemoprophylaxis. It can already be said that chemotherapy undoubtedly prolongs the life of a number of patients. Still to be determined is how fast the community load of infection goes down.

It is certain that death rates from tuberculosis in many areas of the world have in the last decade taken a sudden drop. This is not limited to countries economically prepared to handle the tuberculosis problem. In the United States the rate has dropped from about 113 per 100,000 in 1920 to about 13 per 100,000 in 1953. In Chile from 1920 on the rate ran

about 250 and then during the 50's dropped to around 87. Other countries echo the same story. Tuberculosis experts in many parts of the world are beginning to be much more hopeful. An element in the new optimistic outlook is the success of domiciliary treatment. In some localities the number of beds available for tuberculous patients outnumber the patients. The need for big sanatoriums is disappearing.

In tuberculosis work there is first the task of case finding, i.e. locating persons who discharge tubercle bacilli through the respiratory tract. Next comes the protection of healthy people by increasing their resistance, and here WHO/UNICEF in the Americas has cooperated extensively in the support of BCG campaigns. Third comes the prevention of transmission and here is where the new chemotherapy is making its contribution. It helps do this even where isolation of the patient is not practicable.

The strategy with regard to tuberculosis is changing. Instead of building more isolation hospitals there is emphasis on the use of isoniazid in home treatment of recognized cases and on the prophylactic treatment concurrently of other people in the family with the same drug in smaller doses. Isoniazid has the advantage of being cheap and readily manufactured in any desired quantity.

The broader aspect of this is that tuberculosis may join the group of vanishing diseases.

In leprosy, too, the attitude is changing. More and more cases are being arrested and made non-infectious. In centers where this disease has been a real problem there is now anticipation that practically all lepers who come for treatment will eventually be returned to normal life. The problem then becomes one of returning these agelong outcasts to a normal place in the social structure. The big advance has been in the treatment with sulfones which are not to be considered as an immediate and permanent cure, but rather as a means of arresting the disease, making the patient bacteriuretic, so that by continued therapy there is a final re-establishment restoring the patient to society.

The change here too is one of attitude. Lepers are being treated without hospitalization, and in countries where the

problem is acute, but funds are scarce, the new methods are bringing about a real change in outlook.

Prevention Versus Control

Speaking broadly the public health movement is advancing rapidly in the direction of control, prevention, and then eradication.

This is reflected in the changed contents of medical school curricula in the direction of preventive medicine. It is reflected in the greater emphasis of health benefits demanded by labor, and broadly speaking in the entire social security movement.

Health departments have been in the foreground of this movement in modern medicine stressing prevention. Better a fence at the top of a precipice than a hospital at the foot, is an old adage that still expresses the gist of the public health attitude.

The entire shift in emphasis from control to eradication when considered from this broad point of view is merely one characteristic of a wider movement toward promoting health and forestalling disease. This movement has been making headway ever since the days when English statesmen first promoted water supply and sewage disposal on the simple thesis that a nation's health is a nation's wealth. Viewed as a development of preventive medicine the new emphasis on eradication falls neatly into place.

From a purely economic point of view prevention has always been attractive. Not only is an ounce of it worth a pound of cure, but the great burden of the cost of sickness obviously dwindles when it becomes possible to substitute preventive for palliative measures. Small and relatively undeveloped countries do not have the capital for extensive institutional care. If only a little money is available that little money had better be spent right from the start on preventive measures.

It is in line with some such general point of view that we should consider the broad PASB policy of strengthening health departments.

Strengthening Health Departments

Breaching the Line

The child population of Latin America is relatively large. In part this is due to the high birth rate. In Latin America the group under 15 years of age constitutes 40.5 per cent of the population. In other words nearly half of the population are very young people.

Latin American countries have not only a young, but also

a fast-growing population. The population in South America has doubled in 30 years. The unusually rapid growth is expected to increase at an even greater rate in the next 30 years. From 1920 to 1950 came a jump from 60,313,000 to 110,510,000. By 1980 the population should double again and be almost 223,000,000.

These facts concerning growth should be coupled with

death rates. In eight countries of Latin America nearly one half of the deaths, 49.1 per cent, occur in children under 5. In other words every other funeral is a child under five. This group under five constitutes only 15 per cent of the population. That fifteen per cent of the population which has half of the deaths is obviously the sector upon which those who promote health should concentrate.

If the high death rates of certain parts of the Western Hemisphere are to be brought down, here is the point of attack. Here is where the line can best be breached.

Other countries have breached it. The fact that 49.1 per cent of deaths in Latin America are in the age group under 5 should be compared with a similar figure for Europe which is 10 per cent. For Canada and the United States the figure is 8.9 per cent. Australia and New Zealand get this figure down to 7.3 per cent. This indicates that these early deaths in Latin America are largely preventable.

In selecting the control of diseases in children as a major point of attack the Fourteenth Pan American Sanitary Conference, guided by its experts, followed the strategy of seeking the weak point in the enemy's line.

If it is also remembered that the major cause of deaths among children in some 18 South American countries were the diarrheas, the recommendation to do something about gastro-intestinal diseases in children begins to take on added importance. Ready availability of large quantities of water is helpful in preventing deaths from diarrheas and associated rapid dehydration.

Deficiency of protein in the diet may be another factor. Total protein, animal protein and milk protein, for children in Canada and the United States is much higher than for children in Latin America. The figures for the latter are 65, 25 and 9 grams per capita per day as opposed to the much higher index for Canada and the United States of 90, 61 and 23. In plain words North American children in general get more proteins in the weaning age.

More information on these matters is given in the main body of the Report.

Education and Training

Much has been made this year of the role of the PASB in providing technical assistance in the way of scientific guidance. Such imparting of up-to-date technical information makes possible things that were impossible before.

In addition to providing technical information the PASB through fellowships and active support of seminars and courses stresses education. More attention to the work of the Bureau in this field is given in a later section of this Report.

A chief emphasis this year has been on strengthening both schools of medicine and schools of public health. A seminar conceived on a broad international basis was organized and successfully carried out to advance the subject of preventive medicine. At this seminar held in Chile, South American

countries established a pattern of cooperation in this field which it is hoped will be repeated with 11 remaining countries of Latin America at a similar seminar next year in Mexico.

There was inaugurated in 1955 a far-reaching survey of pediatrics in the medical schools of Latin America. The Bureau is continuing its efforts to distribute key printed materials, such as committee reports, studies, and bibliographies on pedagogical procedures in the field of medical education. Details on cooperative projects in aid of special medical schools are given in the body of the Report. The same is true regarding details of studies on nursing education and aid to courses in nursing and for the training of nursing auxiliaries.

In general the aid to education recognizes the principle that in all progress in the field of applied health provision of well-trained personnel comes first.

The large foundations which were active in the first half of the twentieth century, after blazing certain trails, are now pulling out of the field of health application. They are passing this type of work on to organizations such as the WHO and the PASB. The PASB which has for 50 years been striving for its present strategic position has the necessary connections and must develop and maintain an adequate technical staff to fulfill its ever increasing obligations.

The reader is referred to the main body of the Report for a detailed account of what the PASB is doing in the way of support to fellowships and aid in the establishment of training programs for personnel active in the direct application of health measures.

Pertinent Planning

If a single characterization were to be made of health conditions in certain countries it would be that so far as water supply, sewage disposal and other basic factors having to do with environmental sanitation are concerned, these countries are where the rest of the world, that is, the advanced countries, were 75 years ago. Hence in stressing as a major point the need to improve environmental sanitation, the Fourteenth Pan American Sanitary Conference was presenting an essential strategy.

The purpose of national health planning is to set up in each country a series of activities to be developed in the next five or ten years which will solve national health problems by stages based upon the relative importance of the various programs and upon the technical, economical, and cultural position of the country.

Such planning breaks down into three major elements: 1) diagnosis of health problems, 2) clear view of remedies needed for the solution, 3) application of these remedies on a planned basis. The above is still too general for concrete use.

Planning proceeds more satisfactorily when it centers around specific objectives. With this in mind guides and standards for the implementation of programs are useful if they deal with specific things such as laboratories, malaria, nutrition, smallpox, waste disposal and integrated health services.

These integrated health services are, of course, also a direct reflection of national health planning. With one eye

on the needs and another on the resources of a country, a health program is drawn up. This program may be active at various levels, national, regional or local. The one single practical consideration that makes these integrated programs work is, to put it bluntly, good salaries. A basic desideratum is to insist on full-time employment, adequate compensation, stability of career, and, of course, technical competence.

Pan American Sanitary Bureau planning continues to center around the three main topics of eradication, integration and education. It is necessary to keep working at the eradication of certain diseases. At the same time constant effort is needed to strengthen the year-round work of health departments and in the same way while these other two things are going on a substantial amount, one-third perhaps, of the effort and money should continue to be put into education.

To improve further on a planning program it is necessary to deal specifically with the problems of different countries. New information on these problems is being gathered every year. At the next quadrennial Pan American Sanitary Conference to be held in 1958 there will be a general report on health needs country by country. Meanwhile, through its contacts, its field staff, its Zone Offices, its annual meetings and its constant flow of personnel to and from the field, the PASB is acquiring a working knowledge of conditions in each country. It is on the basis of this knowledge that specific projects are approved and implemented.

The work done in 1955 is discussed in detail in the Sections of the Report which follow.